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Monsters as Evidence: The Uses of the Abnormal Body During the Early Eighteenth Century

JAVIER MOSCOSO
Facultad de Filosofía
Edificio Luis Vives
Universidad de Murcia
30071 Murcia, Spain

Introduction

In 1712 the French Academy of Sciences published in its *Observations Anatomiques* a small report on a monstrous fetus born in Grenoble.[1] Despite being only a half-page paragraph, the article illustrates several of the details more frequently included in this type of literature. We learn, for example, that this monster was born dead and premature; that, except for those deficiencies that "*turned him into a monster*," he had a well-formed constitution; and that his monstrosity was due to an extraordinary disposition of his heart, which happened to be outside the body and hanging from his neck like a medal ("*pendu a son col comme une Médaille*"). The text also includes some other relevant observations regarding the reliability of the information and the social rank and number of the witnesses. But along with the complete set of elements more frequently encountered in these teratological accounts, what really matters here is how the author of this particular report stated that he was going to pay attention only to "*the most singular*" ("*le plus singulier*") aspects of the case. Doing otherwise, so he argued, would imply turning the history of monsters into an endless narrative from which nothing substantial could be learned.[2] Almost eighty years after the publication in 1642 of the *Mon-*

[1] Research for this work was partially supported by a MEC/Fulbright postdoctoral fellowship at the Department of the History of Science, Harvard University, FU94 07222242, and by the research project "Producción de objetos científicos y mundialización de la ciencia," PB94-0003. I am grateful for the insightful comments of Professor Lorraine Daston, Professor Katharine Park, and Dr. Sophie Roux. The responsibility for the content remains, of course, my own.

[2] Académie des Sciences, *Histoire et Mémoires de l'Académie Royale des Sciences pour les annés, 1699–1776* (Paris, 1702–1797). The *Histoire de l'Académie* for the years 1699–

strorum Historia – a 748-page compendium in which the Italian naturalist Ulysses Aldrovandi (1522–1605) had striven to include all available information regarding monsters and prodigies without inquiring further into the authenticity of the cases or the reliability of the sources – the understanding of the discursive strategies for dealing with teratological phenomena was drastically inverted. Far from having to include everything that was known about a given case, a monster report was now written on the basis of an accurate knowledge of the information that was going to be published. The question was no longer whether to recount every detail of what was known but quite the contrary: to know very well what was going to be told.

The meaning and consequences of this policy of discursive self-restraint will be discussed shortly. However, there are some other reasons that this case is relevant to our aims. First, we know that eighteenth-century anatomists, naturalists, and surgeons proposed so many different definitions of the word *monster*, on many occasions after the examination of a single and isolated case, that far too often it became imposible to reach consensus about the monstrous nature of a given individual. If the boy whose history has been outlined above was thought to be a monster proper, and not a normal boy whose heart was entirely monstrous, many other cases could be mentioned where the opposite was asserted. Second, in order to detach the study of monsters from the popular imagery, still anchored during the Enlightenment in medieval and Renaissance sources, the teratologist understood that abnormal conformations had to be credible before they could be accepted as real. Credibility drew the boundaries between facts and rumors, *facta* and *dicta*. This is the main reason that the standard type of teratological communication to learned societies, instead of beginning with the description of the monster, began, curiously enough, with the description of the witnesses. The pressure to demonstrate the veracity of the case under consideration was so acute that occasionally a certificate of authenticity was also included.[3]

1776 will be hereafter cited as *HA*, followed by year of communication and year of publication (in brackets). The same procedure will be used for the *Mémoires* published between 1699 and 1776. They will be cited as *MA*, followed by year of communication and year of publication. Between 1666 and 1699, the Academy also produced both a *Histoire* and different *Mémoires*. Neither was published until 1730. The full citation of this set is Académie des Sciences, *Histoire et Mémoires de l'Académie Royale des Sciences depuis 1666 jusqu'à son Renouvellement en 1699* (Paris, 1730–1733). Unlike the previous sets, the *Mémoires* and the *Histoire* are bound in different volumes. The *Histoire*, in three volumes, will be cited as *HAI*; the *Mémoires*, in ten volumes, will be *MAI*. Finally, the *Registres Manuscrits* (1692–1699) will be cited as *RM*, followed by year and number of spreadsheet being referred to. In this case, we are citing *HA*, 1712 [1714]: 39.

[3] See, for example, Jean Palfyn, *Description anatomique des parties de la femme qui servent à la génération; avec un traité des monstres* [by Fortuno Liceti] *… et une description anatomique de la disposition … de quelques parties … de deux enfans nés dans la ville de*

Given these two difficulties – the lack of agreement on the definition of the term *monster* and the necessity to sustain solid teratological claims regarding the existence and conformation of certain beings – the study of physical abnormalities had to begin with, if not to be strictly confined to, a collection of examples or instances. Our boy born in Grenoble whose heart was hanging from his neck would be just one of those examples. But an example of what? He cannot possibly be an example of a rather ideal and ill-defined ontological category such as "the monstrous" because this expression, which undoubtedly had occupied the teratological narrative since the Middle Ages, systematically surpassed the boundaries in which it meant to be confined. The monstrous always outclassed the mere collection of monstrosities.[4] When reading teratological communications of learned societies, one never comes to know what monsters really are. The only thing we can be sure of is that "this," the boy of Grenoble for example, is a monster. And not only he, of course. The dozens of cases reported in the communications of academies and societies throughout the eighteenth century are monsters. Nevertheless, this enumeration never led, as might have been expected, to a general definition that could provide the general rule by means of which one could determine whether a given individual qualified as a member of this rather peculiar kind of the unkind. When it came to classify a case either as a monster proper or as an otherwise perfectly normal being some of whose parts happened to be extraordinarily deformed, the inconsistencies are too many to be ignored, and the scholar who decided to look exclusively at the cases indexed under the entry "monster" would be missing the entire dynamic process that led to any particular configuration of the realm of "the monstrous" at any specific time.

Grand . . . 1703 (Leyden: Ve. B. Schouten, 1708), p. 43: "*CERTIFICATION: Nous soussignés, certifions que Jean Palfin Anatomiste & Maistre Chirurgien de la Ville de Gand a Anatomisé en notre presence certain Enfant Gémeau mort, de sexe feminin, né dans la susdite Ville le 27 Mai 1703. Et apres avoir lu la Description Anatomique du susdit Enfant qu'il a composé, nous l'avons trouvée tres exactement conforme à la verité, par conséquent digne d'etre imprimée, & de la donner au public: En foy de quoy nous avons signé ce present Certificat, Fait à Gand le 12 Sept. 1703. P. Verhulst, Med. Gand; P. Adenelle, Med. Doct. J. Mahieux, Chirug. Jurat*." See also Jean Méry: "Observations faites sur un Foetus humain monstroeux, & proposées à l'Académie," in *MA*, 1720 [1722]: 8. On these problems, see my "Volkommene Monstren un unheilvolle Gestalten. Zur Naturalisierung der Monstrosität im 18. Jahrhundert," in M. Hagner, ed., *Der falsche Körper. Beiträge zur eine Geschichte der Monstrositäten* (Göttingen: Wallstein Verlag, 1995), pp. 56–72.

[4] See G. Canguilhem, *La connaissance de la vie, Science et pensée* (Paris: Librarie Hachette, 1952).

The fact that from that continuous instantiation no general category of the monstrous can be obtained does not necessarily imply that those beings were just mere curiosities, useless examples of absolutely nothing. Quite the contrary. This paper will attempt to illustrate how the teratological communications of scientific societies, far from being published at random, had a connection, however remote this might appear in principle, with ongoing discussions of various other anatomical and physiological issues that were studied at the time, and that were, almost in their entirety, related to human anatomy. When read in conjunction with other nonteratological reports, it becomes quite obvious how abnormal productions were taken as empirical evidence to sustain anatomical claims, and were also fully employed in the anatomical narrative that surrounded certain disputes on embryological or physiological issues.[5] If those teratological cases described in the transactions of learned societies were examples, they were not examples of a wider category such as "the monstrous." They were, rather, instances of "the normal." The teratological narrative that dealt with major physical abnormalities during the first half of the eighteenth century was not constructed as a mere catalogue of monsters or monstrosities. This could not possibly have been the case because the concept "monster" was not only highly problematic but also ultimately useless. It was, in fact, abandoned by the new teratological science of Isidore and Etienne Geoffroy Saint-Hilaire at the beginning of the nineteenth century. Far from being unproblematic examples of the monstrous, monsters were understood in terms of an "analogical" relationship with respect to the norm. Being no longer signs, they began to be used as evidence in the discussion of normal productions.

At the turn of the seventeenth century, there were various reasons for monsters' becoming models in anatomical inquiries. First, monsters were devoid of the same ethical and pragmatic issues that surrounded human dissections; second, monsters were seen as experiments of Nature; third, all the apparatus related to grant the reality of those singular facts could also sustain other different claims on wider topics. Finally, monsters could be used as evidence in the study of human anatomy in the same way that other "nonmonstrous" models of human anatomy, like the fetus in particular, or like animals in general, were, in a sense that will be explained later on, "pathologized."

[5] Katharine Park and Lorraine Daston in their "Unnatural conceptions: The Study of Monsters in 16th and 17th Century France and England," *Past and Present, 92* (1981), 20–54, also noticed how the French Academy "routinely related normal and abnormal structures, often drawing conclusions applicable to normal anatomy and physiology." My account differs from theirs in that they took monsters' descriptions as given items that happened to be useful, whereas I defend that because they were thought to be useful, they were included in the communications.

To explore these issues, I will focus on a set of problems concerning the physiology of the human fetus and, more specifically, on the debate about the nature of fetal circulation that took place in the French Academy of Sciences during the first decades of the eighteenth century. I do not intend here to suggest that monsters became the binding argument in favor of any of the encountered positions. Neither shall I examine the most intricate technicalities of this particular dispute. My twofold task will consist in exploring, first, how monsters could be used as evidence in a period in which the very notion of evidence was as unclear as the very notion of monster itself. Second, I will attempt to show how that instantiation of exceptions, when being observed in conjunction with other problems of the normal functioning of the human body, provides a certain understanding of what monsters were or were meant to be within the teratological communications of eighteenth-century academies and societies.

Rules of Exclusion

It is already very well known that the large number of papers dealing with some type of physical deformity published during the Enlightenment turned the study of monsters into one of the most recurrent issues within eighteenth-century literature in general and medical journals in particular.[6] Nevertheless, given this extraordinary proliferation of teratological material, which may well have resulted from the sober application of the Baconian program and its passion for collecting and cataloguing nature, there is little doubt that there were fewer reports published than the number of communications on oddities that could have been written. In the *Journal des Savants*, for example, approximately twenty-five reports were written relating exclusively to monsters between 1665 and 1710, but between 1710 and 1750, we can count only eight.[7] Like the *Mémoires* of the French Academy after 1699, the *Acta Eruditorum* or the *Philosophical Transactions* of the Royal Society, the

[6] In the *Philosophical Transactions* of the Royal Society, for example, there are, between 1665 and 1780, more than 100 communications regarding some form of "monstrosity"; the French Academy of Sciences published 130 papers between 1699 and 1770. The *Gentleman's Magazine* produced nearly 100 articles on monstrous births and miscarriages during the 1740s only, and, to some extent, the same could be said of the *Journal des Savants*, the *Miscellanea Curiosa medico-physica*, and *La Gazette de France*, to cite three very different examples.

[7] Abbé Claustre, *Table Générale des matiéres contenues dans le Journal de Savans de l'édition de Paris. Dépuis l'anne 1665, jusqu'en 1750* (Paris: Briason, 1753–1764), VII (1757).

journal reduced not only the quantity of papers related to teratological matters but also the treatment that was given to those extraordinary phenomena.[8]

To explain this change of policy related to publication of reports on extraordinary phenomena, some reasons should be taken into consideration. First of all, learned societies in general, and notably the French Academy after its second foundation in 1699, strove to dissociate the study of monsters from what has been called the seduction of the marvelous.[9] The savant could not be mistaken for the layman, and many comments of that time may be found suggesting that prodigies were of interest only to the uneducated mind. Second, there was also the issue of how to handle increasing amounts of teratological material. By the early eighteen century – as in many other European academies and societies, and notably in the Royal Society of London – the French Academy had gathered a considerable amount of information related to abnormal anatomical conformations or monstrous births. Even without taking into consideration the massive compendia on monsters written during the Renaissance, which remained uncited for the most part and practically ignored in academic communications, at the turn of the seventeenth century the number of monsters reported in medical or paramedical literature had grown so considerably that the surprising frequency with which these "unrepeatable" and "unique" events seemed to occur was unavoidably observed. This, in turn, implied a certain change in the way in which monsters were both defined and understood, for if they were still bizarre, they were no longer infrequent. Or in other words, for the first time the oddity was considered to be fairly common. Much more so because the identification of monstrosities, avoiding the primary signification of what was evident by itself, came to be

[8] On the *Journal des savants*, see Jacques Roger, *Les sciences de la vie dans la pensée française au XVIIIéme siècle: La génération des animaux de Descartes à l'Encyclopédie* (Paris: Armand Colin, 1963), pp. 186–187. The *Philosophical Transactions* contained no fewer than forty communications on monstrous phenomena between 1665 and 1712. This rate, however, slowed down as the century progressed to such an extent that from 1775 to 1810, only sixteen cases were published, of which about half dealt exclusively with malformations. See *An Index to the Anatomical, Medical, Chirurgical and Physiological Papers Contained in the Transactions of the Royal Society of London from the commencement of that Work to the end of the year 1817* (London, 1818). The only important exception to this rule was the journal of the Deutsche Akademie der Naturforscher, *Miscellanea Curiosa medico-physica*, published in Leipzig between 1670 and 1706 (17 vols.) It was superseded in 1712 by the *Academia Caesareo-Leopoldinae nature curiosum ephemiredes.* For the *Acta Eruditorum*, see Hub Laeven, *The "Acta Eruditorum" under the Editorship of Otto Mencke (1644–1707)* (Amsterdam and Maarseen: Apa-Holland University Press, 1990).

[9] See Daniel Mornet, *Les sciences de la nature en France au 18ème siècle* (Paris: Armand Colin, 1911), chap. 2, and Katherine Park and Lorraine Daston, *Wonders and the Order of Nature, 1150–1750* (New York: Zone Books, 1998), chap. 9, "The Enlightenment and the Anti-Marvelous."

attributed to those parts hidden inside the body and whose deformity could not be inferred from the outward physical appearance. Unlike the layman, whose monsters were either seen or told about, the monsters of the learned surpassed the boundaries of visual perception and oral tradition. They entered the realm of the unseen and became almost infinite in their possible appearances and in their countless variations. As Fontenelle writes in the *Histoire de l'Académie*: "Apparently there are many more particular conformations than we thought, for the number of dissections of human corpses is very reduced, and even so, many singular structures have been found."[10] Indeed, because one of the explanations of the origin of monsters lay in accidental deviations from the normal structure, the number of monsters seemed to be as high as the number of all possible accidental deviations and increased proportionally to the complexity of the anatomical structure under consideration.[11]

From this acknowledgment of the potentially endless nature of the history of monsters and extraordinary malformations, the French Academy established an implicit typology of monsters induced from, and generated after, a mechanism of avoidance of redundancy. Beyond some other distinct and explicit classifications and, notably, the arrangement of monsters into monsters by excess, by defect, or by transposition of parts – which had spanned with minor variations the whole history of teratological thinking – the academy came now to recognize that singularity as such could no longer be taken as a defining characteristic of major physical abnormalities because many of these "unique" conformations could be far too often regarded as déja-vues.

This recognition of the recurrent character of beings that were, at least in principle, anatomically unique provided in turn new insights into the way in which new specimens could be described using previous instances of

[10] *HA*, 1701 [1719]: 55. See also *HA*, 1701 [1719]: 37: "Comme les singularités nouvelles de la Nature viennet ordinairement à l'Academie. . . . ". The extension of the word *monster* to the internal organs of beings who were etymologically "non monstrant" became more and more common during the eighteenth century. Many examples may be found in the *Mémoires* of the Académie and in other learned journals. See, for example, "Observation faite sur le corps d'un Soldat mort à l'âge de 72 ans," in *MAI* 1686–1699 [1730]: 731–733. To my knowledge, the first definition of *monster* that explicitly acknowledged this sense contrary to the Latin etymology of the word was given by the physiologist Albrecht von Haller: "The word 'monstrum' seems to designate by the very nature of its language, animal aberrations or deviations from the habitual pattern of formation so evident that even the most ignorant eyes were forced to see them. For us, the essence of the word comes also to indicate the interior formation of even vaster and more prominent parts." See Haller, *Opuscula sua anatomica, de respiratione, de monstris* (Göttingen, 1751).

[11] *HA*, 1709 [1711]: 44. The title of the communication is "sur une végétation singulier," and one of the conclusions more frequently inferred from this type of analysis was that monstrous plants were "less numerous and less extraordinary."

similar cases. In 1733, the anatomist Benignus Winslow (1669–1760), for example, proposed a new classification of monsters yet felt no need to add new examples to an already unmanageable list. While discussing the divine origin of monstrous productions, he refrained from increasing the number of specimens, referring instead to the "monster of Méry" – a specimen first described by Jean Méry in 1701 – to the "monster of Petit," or of Duverney or Lémery, as exemplary cases of certain patterns of deformity.[12] To some extent, those "perfect monsters", as Fontenelle named them, had become prototypical, paradigmatic instances that made redundant any other example of the "same kind." Monsters were thus implicitily divided into two distinct categories: those who despite their extraordinary conformation happened to be, as it were, quite ordinary in conforming to a well-established pattern, and deserved therefore no further investigation; and those who were monstrous not only with regard to the normal but also with respect to the rest of all other abnormal cases. But if redundancy was enough to turn the history of monsters into an endless and useless narrative, novelty alone was not a guarantee of publication. At the turn of the seventeenth century, monsters were not studied because they were uncommon or unique; in fact, they were no longer either of these. They were examined because they were regarded as valuable, or potentially valuable, for anatomical or physiological inquiries. It is true that monster reports provided none of the experimental settings under which these extraordinary productions could be reproduced. Most certainly, they did not begin with the accurate description of the conditions that, everything else being equal, would generate the same outcome. But other than that, monsters were regarded as valuable as any other experimental procedure. Indeed, they were observed and described as experiments of Nature herself. This is the main reason that the teratological communications of European academies and societies reflected the same narrative that surrounded any other experimental practices: from the legitimation of the witnesses to the attempts to explain away, or naturalize, the sentiment of wonder. From this point of view, "perfect monsters" also became redundant. They were neither curious nor useful. And, in fact, they were no longer monstrous. What happened to them was exactly the opposite of what occurred to the monstrous races during the Renaissance. On the one hand, we had monsters, perfect monsters, who were no longer monstrous; in the other, we dealt with monstrous beings, like sirens, cyclops, or the like, who were not described as monsters. For the most part, neither of them qualified for publication in the teratological communications of the learned societies, or if they did, they did so only once. When nature replicates, as it were, her own experiments, the explanation for these produc-

[12] *MA*, 1733 [1735]: 366–388.

tions may still be a problem, but the experiment is no longer such and, in a sense, becomes uninteresting, useless, or both.

As for those other monsters who systematically defied classification and who remained individuals, instances of, in principle, nothing other than themselves, the question that remains is, What did they have to make them suitable for publication, what made them both curious or useful, and, by the same principle, what made them monsters in the first place?

The Understanding of Monsters as Models

Between 1692 and the early 1720s, the Anatomy Section of the French Academy became involved in a debate regarding the nature of the fetal circulatory system. Though the anatomist and surgeon Jean Méry, who initiated the dispute, died in 1722, the debate on whether the fetus's blood flow crossed the foramen oval from left to right or, quite on the contrary, from right to left, remained alive well until the early 1740s. Even in 1774, the surgeon Raphael Sabatier (1731–1811) published a further communication on the issue. Born in 1645, by the late 1680s, Jean Méry had become one of the leading surgeons and anatomists of France.[13] Because of both his extraordinary ability as an observer and his almost unhealthy capacity for work, he had succeeded in obtaining the most prominent positions open to an anatomist in the Ancien Régime.[14] He was appointed Surgeon to the Queen in 1681; Chirurgien Major des Invalides in 1683; member of the Académie des Sciences in the Anatomy Section in 1684; and, finally, Premier Chirurgien de l'Hôtel-Dieu in 1700. Working at the same time at the Academy of Sciences and at the Hôtel-Dieu, Méry had the possibility of combining firsthand work on both human and animal anatomy. It was the practice of the latter discipline that led him, along with his fellow anatomist and member of the academy Joseph-Guichard Duverney (1648–1730), to undertake a thorough study of the anatomy of

[13] That would even lead him to undertake different missions ordered by Louis XIV, including a trip to attend the health of the queen of Portugal, and another mysterious journey to England that took place in 1692, allegedly to investigate the legitimacy of the birth of the Prince of Wales, an episode that many have wanted to relate to the famous incident of the "Iron Masque." See Fontenelle, "Eloge de Méry," in *HA*, 1722. See also Dr. Hoeffer (sous la direction de), *Nouvelle Biographie Générale depuis les temps les plus reculés jusqu'à nos jours avec les renseignements bibliografiques et l'indication des sources à consulter* (París: MM. Firmin Didot Frères, 1857–1866; reprinted in Copenhague, *Rosenkilde et Bagger*, 46 vols.

[14] Martin Lister, who visited Paris in 1698, described Méry as "a most painful and accurate Anatomist, and free and communicative Person." M. Lister, *A Journey to Paris on the year 1698* (London: Jacob Tonson, 1699). Also quoted by Dr. K. J. Franklin, "Jean Méry and His Ideas on the Foetal Blood Flow," in *Annals of Science, 5* (1945), 203–228.

the tortoise, first in 1676 and then again in 1685.[15] It was, more specifically, on the grounds of these inquiries into the circulatory system of the tortoise that Méry dared to argue, in a short *mémoire* read in the academy on January 16, 1692, that the fetus's bloodstream followed a pattern different from that maintained by Harvey and fully accepted by the whole community of anatomists.[16] For whereas for the majority of his contemporaries, or at least for those somehow interested in such a subtle issue, the lack of respiration in the fetus proved that the blood crossed the foramen oval from right to left, Méry argued, on the contrary, that this passage took place from the left to the right side of the fetus's heart.

What became known during the first years of the eighteenth century as the "*ancien système*" of fetal circulation was indeed modeled after William Harvey and Richard Löwer's explanations of the adult circulation and, notably, after Harvey's account in his *Exercitatio anatomica* of 1628.[17] According to these authors, except for two important differences, the fetal circulation followed essentially the same pattern as the adult. These two differences were related to the universal recognition of the lack of pulmonary respiration of the fetus and to some other variations in the anatomy of its cardiovascular apparatus. For one thing, since the times of Galen, human fetuses had been known to possess a passage of communication between the two heart auricles. It was Vesalius who first described that passage as oval, and Leone-Giambapttista Carcano (1536–1606), a disciple of Falloppio, who was the first anatomist to offer a full description of this "foramen ovale".[18] The second anatomical difference was another channel of communication between the descendent aorta and the pulmonary artery, known today as *ductus arteriosus*. These two passages were known to be open during the time of gestation and to close progressively after birth.[19]

[15] *RM*, 1685, fol. 144. See also Claude Perrault, *Mémoires pour servir à l'Histoire naturelle des animaux*, in *MAI* (1666–1699) (Paris: par la compagnie des Libraires, 1733).

[16] See *RM*, 1692, fol. 75, and *MAI*, X: 65. Regarding the debate on fetal circulation see James Franklin, "Jean Méry (1645–1722) and His Ideas on the Foetal Blood Flow," *Annals of Science, 5* (1945), 203–228. On Méry, see J. C. Herpin, "Notice historique sur la vie et les Travaux de Jean Méry," in *Comptes-Rendus des Travaux de la Société du Berry à Paris, 11* (1863), 434–474; René-Louis Jeudy, *Les principaux Anatomistes Français du XVIIè Siècle* (Paris, 1941), and Jacques Roger, *Les sciences de la vie* (1963), pp. 172–173.

[17] William Harvey, *Exercitatio anatomica de motu cordis et sanguinis in animalibus* (1628), VI, 33–36, and XVI, 62, XVII, 65–66. See also Harvey, *Exercitationes de Generatione Animalium* (Padua: P. Frambotti, 1651), *Anatomical Exercitations concerning the Generation of Living Creatures*, Eng. tr. by Martin LLewellyn (London: Pulleyn, 1653).

[18] Jean-Baptiste Carcani, *Anatomici Libri II in quorum altero de cordis vasorum in foetu unione pertractatur* (Ticini: Apud Hieronymun Bartholum, 1574), in-8°.

[19] See K. J. Franklin: "A Survey of the Growth of Knowledge about Certain Parts of the Foetal Cardio-Vascular Apparatus, and About the Foetal Circulation, in Man and Some Other

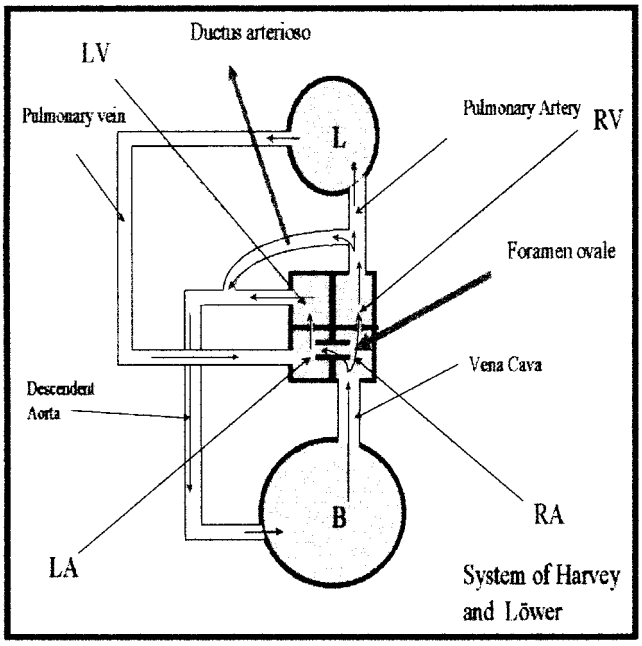

Figure 1.

Given these two morphological differences, the fetus's bloodstream, though observing the same basic direction as in adults, had to follow a slightly different pattern. According to this "*ancien système*," the body's bloodstream traversed the vena cava up to the right auricle. From there, however, instead of discarding all the blood into the right ventricle, it followed two different directions. Part of the blood was dropped into the left auricle through the foramen ovale, from where it passed into the left ventricle and the descendent aorta. The remaining blood spilled into the pulmonary artery, where it was also divided. Some of it followed the channel of communication and ended up in the aorta; the rest continued through the lungs, the pulmonary veins, the left auricle, and so forth. This system had remained unchallenged since the 1650s and it continued to form the basic understanding of the fetal circulation until Méry's *Mémoire* of 1692 (see figure 1).

According to Méry's anatomical dissections, the heart of the sea tortoise was composed of three intercommunicating ventricles. Between the right and the left ventricle, there was a conduit, very much like the foramen ovale in the

Mammals. Part I: Galen to Harvey," in *Annals of Science*, V (1945): 57–89. Along with the story of the foramen ovale and the *ductus arteriosus*, the reader will also find in this paper the relevant information regarding the *ductus venosus*, the *tuberculum intervenosum*, and the *valvula venaa cavae inferioris.*

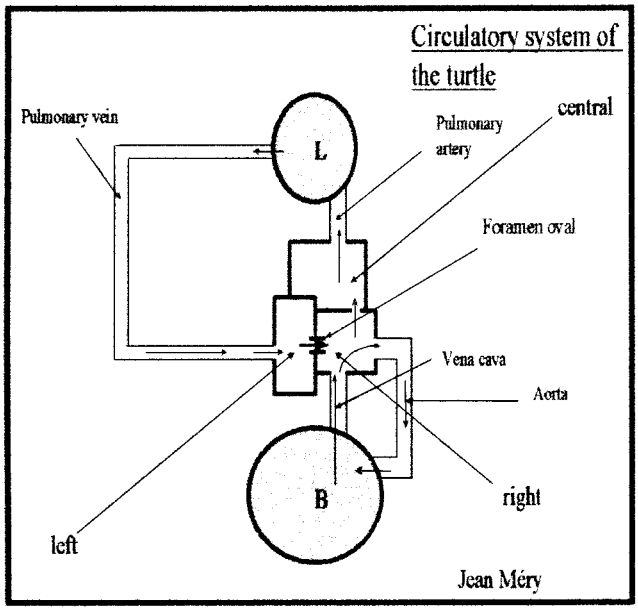

Figure 2.

fetus heart. In addition, its circulatory system was endowed with another passage that resembled quite remarkably the communicating channel, or *ductus arteriosus*. In addition, whereas the left ventricle allowed access only to the pulmonary veins, and the central to the pulmonary artery, both the descendent aorta and the vena cava originated from the right ventricle. From all these facts, Méry concluded that "since the foramen ovale of the tortoise only differs from the foetus's by its position, and given that in both cases it is communicated with the pulmonary vessels, it seems very likely that it has the same use in both the tortoise and the foetus."[20] (See figures 2 and 3.)

Though the ability that the tortoise and the fetus appeared to share to keep themselves alive over long periods of time without respiration was a *locus communis* during the early eighteenth century, by considering the anatomical similarity between their respective hearts, Méry inferred two apparently contradictory conclusions. First, he asserted that the mechanism used by tortoises to hold their breath differed entirely from the explanation of the lack of pulmonary respiration in the fetus. Despite which, however, he also maintained that the blood circulation in both the tortoise and the fetus followed essentially the same pattern.

To sustain his position further, he considered the different capacity of the pulmonary artery in the fetus in relation to the size of the aorta. He knew that

[20] Ibid., 114–115.

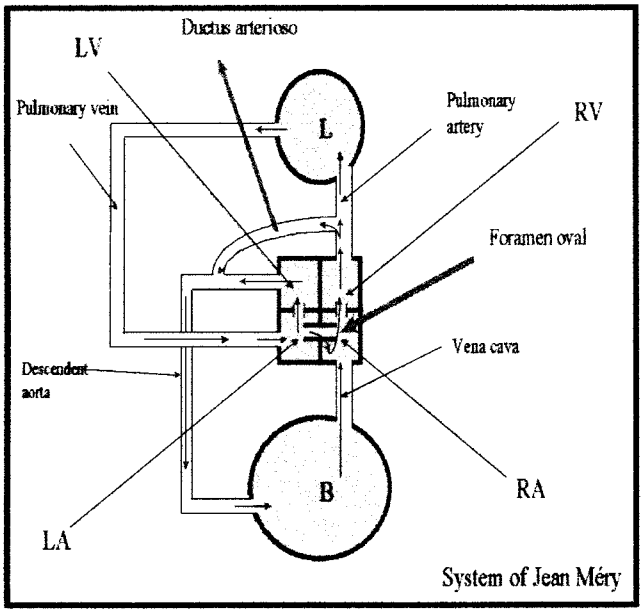

Figure 3.

in the adult human, the pulmonary artery received all the blood that crossed the vena cava, and because the aorta also received the same quantity of blood, the straightforward conclusion was that the aorta and the pulmonary artery must have, as indeed they have, identical capacity. However, given that in human fetuses the capacity of the pulmonary artery is almost double that of the aorta, Méry inferred that the quantity of blood that came across the latter should almost double the amount of the former. As we have seen, according to the *ancien système*, it was the foramen ovale that prevented the pulmonary artery from receiving all the blood carried by the vena cava. Because the bloodstream crossed the foramen ovale from the right to the left ventricle and into the aorta, it seemed that this vein would receive twice as much blood as the pulmonary artery. According to Méry, however, the pulmonary artery stored all the blood coming from the vena cava, plus what was dropped into the right ventricle through the foramen ovale. Therefore, he argued, the aorta received much less blood than the pulmonary artery, as the different sizes of those vessels came to confirm.[21]

[21] See Jean Méry, *Nouveau Système de la circulation du sang* (Paris: Jean Boudot, 1700); "Faits dont je parle dans mes dissertations," in Jean Méry, *Oeuvres complétes de Jean Méry, réunies et publiées par L. H. Petit* (Paris: Felix Alcan, 1888), pp. 130–134. This work will be cited hereafter as *OCJM*.

Though Méry continued to champion his new system in different academic communications, when his ideas were first discussed by Duverney in 1699, this latter anatomist argued that his colleague had not paid enough attention to the true method of comparative anatomy. Duverney, who had also provided descriptions of different varieties of tortoises in 1676,[22] and who had worked closely with Jean Méry until 1692, declared that "if the author of this new system [Méry] had used on this occasion the method that has contributed so much to illuminate the structure and the use of the parts of the human body, i.e., Comparative Anatomy, he would have also examined the heart and the respiratory system of the vipers and fish, and he could have not been mistaken about the true use of the foramen ovale in the foetus."[23] Opposing Méry's hypothesis, Duverney – member of the Academy of Sciences since 1674 and appointed professor of anatomy at the Jardin du Roi in 1679 – also argued that a valve existed in the foramen ovale that allowed the blood to cross the fetus's heart from right to left, but not the other way around. Under closer examination, Méry, however, not only questioned the true use of this valve but even went to the extreme of denying its very existence.[24]

Almost immediately after Méry first presented his views to the academy, his system was rejected on quite different grounds. In 1700, both Daniel Tauvry (1669–1701) and the surgeon Paul Buissière took an active part in the increasingly difficult dispute.[25] In 1710, Philipe Verheyen (1648–1710) published another treatise on the existence of the valve of the foramen ovale.[26] In 1717, the anatomist Jacques-Bénigne Winslow (1669–1760) demonstrated the existence of another valve, the "Eustachius valve," by means of which he thought that both the "*ancien*" and Méry's system could be explained. One

[22] *MAI*, vol. I, 207–211.

[23] *MA*, 1699 [1718]: 257–258.

[24] *HA*, 1699 [1718]: 27: "*M. Méry ne nia pas seulement cet usage de la valvule de M. du Verney, il en nia jusqu'à l'existence*."

[25] The case of Daniel Tauvry (1669–1701), who had become a doctor in the university of Anger when he was fifteen, published his *Anatomia raissonée* when he was twenty-one, and who had been received in the académie as an *associé* in 1699, is worth considering. He had published in 1700 a small treatise, which was answered by Méry that very same year. See Jean Méry, *Nouveau système de la circulation du sang par le trou ovale dans le foetus humain*, avec les réponses aux objections de Duverney, Tauvry, Verheyen, etc., contre cette hypothèse, 2 pt. (Paris, 1700), in-12, and D. Tauvry, *Traité de la génération et de la nourriture du foetus. Réplique aux réponses de M. Méry* (Paris: chez Barthelemy Girin, 1700), in-12. P. Buissière, *Lettre … pour servir de réponse … à M. Méry sur le usage du trou ovale dans le foetus*, etc. (1700), in-12. Very little is known about Paul Buissière. He was active at the end of the seventeenth century, lived in Copenhagen, and became a member of the Royal Society of London.

[26] P. Verheyen, *Corporis humani anatomia liber primus, sucundus … accedit … controversia de foramine ovali inter authorem & D. Mery, etc.*, vol. II (1710), in-4°.

year later, in 1718, the anatomist Pierre Simon Rouhault proposed another way of understanding fetal circulation that differed from those of Harvey, Méry, and Winslow. In 1725, he finally sent to the académie a manuscript entitled *De la circulation du sang dans le Foetus*,[27] which was answered the same year by Winslow in another communication published by the *Mémoires*, in turn answered by Rouhault in 1728.[28]

Without going too deeply into the technical details of the dispute, the criticism received by Méry can be comprehended in three different categories. First, his ideas were challenged on the grounds of the very existence of that valve, allegedly located in the foramen ovale, which was thought to support exclusively the *ancien système* of fetal circulation; second, it was argued that the different size of the circulatory veins and arteries, notably of the pulmonary artery and the aorta, did not necessarily imply that a greater quantity of blood circulated through the wider vessels. Finally, the tortoise's heart, the study of which had first led Méry to his radical proposal, was no longer regarded as a legitimate model of the fetal circulatory system. In all three cases, what was at stake here was something more than the rather ludicrous issue of whether the fetus's bloodstream crossed the foramen ovale from right to left or vice versa. A quick glance at the number of papers published on this particular topic should suffice to indicate the rather extraordinary interest that it generated among the members of the French Academy. Far from being a mere dispute on a rather peculiar topic, this controversy involved the far more difficult issue of how these academic quarrels ought to be settled in the first place. The problem being that during the first decades of the century, no single piece of evidence was presented that could have been possibly taken as decisive proof in favor of either of these systems.

With regard to the different size of the vessels, for example, the academy, after having accepted its new regulations in 1699, named different commissions "to study exactly the facts that will be produced by the contending positions."[29] However, by the early eighteenth century, the problem was still far from being solved because the different commissions of independent witnesses, formed in their majority by physicians like Dodart or naturalists like Tournefort, were clearly verifiyng "contradictory opinions."[30] Indeed,

[27] This paper would be published in Pierre Simon Rouhault, *Discourse concernant les différents changements qui arrivent à la circulation du sang du foetus* (Turin, 1725), in-12.

[28] Winslow, "Eclaircissements" and "Suite des éclaircissements," in *MA*, 1725 [1727], pp. 23–34 and 260–281; Rouhault, *Réponse de P. S. Rouhault . . . à la critique faite à son mémoire de la circulation du sang dans le foetus humain par M. Winslow*, French and Italian edition (Turin, 1728), in-4°.

[29] *HA*, 1699 [1718]: 29. The reglamente of the Academie and, more specifically, art. XXV was published in *HA*, 1699 [1718]: 7.

[30] *HA*, 1699 [1718]: 29.

whereas Méry had proved to his witnesses that the pulmonary artery was wider than the aorta, Daniel Tauvry had demonstrated exactly the opposite. And whereas Méry asserted that the size of the veins and the arteries should suffice to determine how much blood passed through those vessels, Tauvry argued that the wider size of the pulmonary artery could imply only that a smaller quantity of blood circulated *more slowly* through that vessel and that a greater quantity of blood passed *more quickly* through the aorta. This "independent verification of contradictory facts," as we could call it, produced in turn remarkable tension between the authors of the *Mémoires* and the in principle official and unifying voice of the *Histoire*. The fact that Jean Méry protested on different occasions that the académie as a whole had taken sides against his position, is only one of the many places where this internal tension can be more clearly observed. Besides, as we shall see, the académie did not always oppose Méry's position. Far from it; it was willing to accept evidence that, in theory, seemed to support the new system and, despite Méry's protestations, attempted to play the role of a fair and just tribunal. Without any doubt, the académie wanted above all to see the two positions reconciled in an undivided truth. The pursuit of that truth, however, implied the acceptance of contradictory evidence over rather short periods of time. When Benignus Winslow published his paper in 1717 on the Eustachius valve, in which he explained how both Méry and his opponents could be right at the same time, the *Histoire* congratulated itself for having foreseen as early as 1703 that long-awaited reconciliation.[31] The time had indeed come in which, in the academy's own words, "many unrelated truths, as soon as they increase their number, offer to the mind their connections and their mutual dependence in so lively a fashion, that it seems that, after having been detached from each other by a sort of violence, they strive naturally to come together."[32]

In a sense, the Parisian Compagnie was becoming an organized body of knowledge at the same time as its objects of inquiry were being unified and its disputes settled. It was not at all a perfect corpus though. For one thing, Méry himself dismissed Winslow's anatomical interpretations, and Rouhault also

[31] Winslow, "D'une valvule singulière de la veine-cave inferiure, à l'occasion de laquelle on propose un sentiment nouveau sur la fameuse question du trou ovale qui semble également appuyé par les preuves favorables aux deux opinions contraires," in *MA*, 1717 [1719]: 211–226. See also *HA*, 1717 [1719]: 17–21: "Sur une nouvelle valvule de la veine-cave inferieure qui peut avoir rapport à la circulation du sang dans le Foetus."

[32] Fontenelle, preface to the *Histoire de l'Académie* for the year 1699: "*Le temps viendra peut-être que l'on joindra en un corps régulier ces membres épars, & s'ils sont tels qu'on les souhaite, ils s'assembleront en quelque sorte d'eux-mêmes. Plusieurs verités separées, dès qu'elles sont en assés gran nombre, offrent si vivement à l'esprit leurs rapports, & leur mutuelle dépendance, qu'il semble qu'aprés avoir été détachées par une especе de violence les unes d'avec les autres, elles cherchent naturellement à se réunir*."

attacked them on different grounds. The corpus that the académie claimed to be after 1699 was not exactly chimerical – the king's authority, if nothing else, was also at stake here – but there was a feeling at that time that this corpus was more a promise of something to come than a given and already achieved reality. The foundations upon which this new building of knowledge was meant to stand were made very clearly of unrelated truths and *disjecta membra*, and not only in a metaphorical sense. The raw materials that furnished the debate on the circulatory system of the fetus, a debate that received much more attention during the first stages of the renewed academy than any other issue related to anatomy, medicine, or natural history, was much more than a collection of fetuses. In fact, there were not many fetuses represented in this debate, and of those examined, all of them were either deformed or monstrous. Monsters and tortoises were indeed the *disjecta membra* from which the truth, or at least the true system of the fetal circulation, was supposed to arise. They provided the raw materials upon which to build the anatomical evidence needed to discuss not tortoises or monsters but fetuses and, ultimately, adult humans. In a sense, they were a language, a set of rules, conventions, and representations that proved very useful to talk about, something other than themselves. By the same token, they proved not only quite useless but also irremediably absurd and ultimately quite vulgar, when they were meant to be used as a sign to talk about monsters or tortoises themselves.

Tortoises, Monsters, and the Like

Before Méry dared to formulate a new system of fetal circulation based on the morphological similarity between the human fetus and the tortoise, the use of analogical reasoning in anatomical inquiries had been widely developed.[33] Even excluding the works of antiquity, during the Renaissance and the seventeenth century many anatomists and naturalists had praised the virtues of the comparative method. When Bernard de Fontenelle (1657–1757), the secretary of the French Academy, wrote the preface for the new *Histoire de l'Académie*, he, too, unmistakably stated the need for those comparisons in the study of human anatomy. The same idea was included by Claude Perrault (1608–1680) in the preface of the *Natural History of Animals*, the most prominent academy publication in comparative anatomy at that time. Not even the reported similarity of the ability of the tortoise and the fetus to hold their breath had passed unnoticed.[34] Even though Jean Méry had concluded that it was impossible to infer from the anatomical similarity between the tortoise and the fetus that

[33] See Francis J. Cole, *A History of Comparative Anatomy. From Aristotle to the 18th Century* (London: Macmillan, 1944).

[34] *HA*, 1699 [1718]: 26.

neither of them could, so to speak, hold their breath for the same reasons, he nevertheless insisted upon the validity of the comparison.[35] That is partly the reason that many of the anatomists involved in the debate on fetal circulation were also engaged in an anatomical dispute on the morphological characteristics of the tortoise's circulatory system. The dispute was indeed as much about that particular problem as it was about anything else. Despite the fact that many of the anatomists who dealt with this problem, like Daniel Tauvry for example, had praised the virtues of the comparative method in their own works, they were not willing to accept in this case that the tortoise could be taken as a legitimate model of the fetal circulatory system.[36] This is the main reason that forced Méry to deal with an increasing number of publications on the anatomical system of that animal. The structure of the debate was systematically based on the anatomical proof that could be gathered, among other things, from the dissection of different tortoises. When Duverney, for example, decided to raise his voice against Méry's system for the first time in 1699, he followed exactly that very path. First, he says, he will describe the heart of the American sea turtle, recently received from Versailles, then he will add some other observations on vipers, frogs, and certain fish "that have many links [rapports] with the turtle"; then he will describe the usages of their different parts; and finally, he will base his criticism of the system proposed by Méry[37] on those descriptions of parts and usages. Also in 1713, when Paul Buissière published his *Nouvelle déscription anatomique du coeur des tortues terrestres de l'Amerique et des vaisseaux*, it was not only summarized extensively in the *Mémoires de Trévoux*,[38] it was also praised by J. L. Petit, and most certainly discussed at length by the indefatigable Méry.[39] At this point, it can no longer surprise the reader to find out that all the plates included in the first volume of the renewed acadèmie were related to the circulatory system of the turtle, with only one exception. What may be surprising, however, is to find out that the academy was not really interested at all in the study of animal anatomy and that, therefore, those plates, though being undoubtedly

35 Jean Méry, *OCJM*, pp. 118–119.

36 Tauvry, *Traité*, p. 2: "*J'ai donné quelques descriptions Anatomiques des parties de quelques animaux, qui n'avoient point esté donnés*, afin de m'en servir pour prouver par l'anatomie comparée *quelques systemes qu j'avance*" (my emphasis).

37 *MA*, 1699 [1718]: 228.

38 Paul Buissière, *Nouvelle déscription anatomique du coeur des tortues terrestres de l'Amerique et des vaisseaux avec les figures* (Paris, 1713), in-12. See also *Mémoires pour l'histoire des Sciences et des Beaux-Arts* (*Mémoires des Trévoux*) (December) 1713, t. IV, p. 2617 & ss.

39 Méry, *Réflexions de M. Méry sur la description du coeur de la tortüe faite par Monsieur Buissière, membre de la société Royale d'Angleterre, et sur la lettre approbative de Monsieur Petit, Maître Chirurgien de Paris, et Anatomiste*, [1713], in *OCJM*, Appendice, 545–552.

of turtles, functioned indeed as representations of deformed fetuses. Whereas from the point of view of any classificatory system a turtle was, ontologically, a turtle, from the point of view of its scientific use, a turtle acted, behaved, and represented a fetus. This being, of course, the main the reason that the academy became so interested in the turtle's morphology in the first place. The material evidence from which a better understanding of the human anatomy could eventually be gained seemed to be contained in its insides. As Fontenelle wrote in the Histoire de l'Académie:

> The anatomy of the animals should be quite indifferent to us. We are only interested in knowing the Human Body. But this part whose structure is so delicate and confused in the human body that it becomes invisible, is sensitive and manifest in the body of a certain Animal. It is for that reason that not even the Monsters are to be neglected. The mechanism hidden in a certain species or in a common structure is developed in another species or in an extraordinary structure, and it could be even said that nature, by means of multiplying and varying her works, cannot avoid unveiling her secret.[40]

It is in this sense that animals too can be said to have been pathologized whenever they were meant to work as models of human anatomy. In Perrault's work on the *natural history of animals,* for example – a book that contained no trace of human anatomy and that nevertheless was said to serve mainly that purpose –[41] we find that the way in which those animals were described did not differ in any important respect from the way in which some other singularities, and notably monsters, were portrayed at that time. Quite the contrary; all the elements are there. We read, first of all, that the descriptions were purely "anatomical," that is, a description from inward to outward.[42] Second, "they are not the Work of one private Person, who may suffer himself to be prevail'd upon by his own Opinion,"[43], but the book of an entire "compagnie formed of men who, unlike most of peoples, have eyes to see and consider

[40] *HA*, 1699 [1718], preface: "*L'Anatomie des Animaux nous devroit être assés indifferente, il n'y a que le Corps humain, qu'il nous importe de connoître. Mais telle partie dont la structure est dans le Corps humain si délicate ou si confuse qu'elle en est invisible, est sensible & manifeste dans le corps d'un certain Animal. De là vient que les Monstres même ne sont pas à negliger. La Mechanique cachée dans une certaine espèce ou dans une structure commune se développe dans une autre espèce, ou dans une structure extraordinaire, & l'on diroit presque que la Nature à force de multiplier & de varier ses ouvrages ne peut s'empêcher de trahir quelquefois son secret*."

[41] Perrault, *Mémoires pour server à l'Histoire naturelle des animaux* (1733), p. iii.

[42] Ibid., p. x.

[43] Ibid., p. vii. Cited also in Francis J. Cole, *A History of Comparative Anatomy* (above, n. 34), p. 402.

these sort of things."[44] Third, as in the case of monsters, the importance of the plates lay not *so much* "in representing well what was seen, as in seeing well what should be represented."[45] Still more important was the fact that this was a description of singularities because "we only discuss singular things, and since we only speak of the animal that we are describing, we say that 'our lion', 'our bear' or 'our eagle' had a certain conformation and, therefore, we predicate no general attribute whatsoever of any animal."[46] In all these cases, the procedure to study normal productions for the sake of human anatomy was to turn them into singularities. It was not, as Galen asserted, that the elephant did not have a particular vesicle but, rather, that "our elephant," the very same elephant that was dissected by Duverney in front of Louis XIV, had no such thing.

Besides, during the early modern period the word *anatomy* referred mainly to the anatomy of the human adult male, and some scholars have already argued that the female body appeared to some extent as "pathologized."[47] However, the same could be argued about the fetus: "It is pretty obvious that the adult man has very different proportions to a foetus, and that a man made according to a foetus' proportions would be monstrous and would no longer look like a man."[48] It was not simply that the fetus was very often taken as a monster but, rather, that he appeared described far too frequently as a monster by excess: "the foetus does not only differ from a man in their respective proportions, but also in that the foetus possesses many parts that the man does not."[49]

To some extent, talking about the pathologization of normal specimens becomes the counterpart of the naturalization, or medicalization, of monsters that took place around this time. I by no means intend to say that the singular could be pathologized because the abnormal was, on the other hand, becoming normal but, rather, that both processes progressed parallel to each other and that one could not have occurred without the other. This becomes obvious when the communications related to physiological debates are read in conjunction with the teratological communications.

[44] Perrault, *Mémoires* (above, n. 42), p. viii.

[45] Ibid., p. xx. Also quoted in Cole, *A History of Comparative Anatomy* (above, n. 34), p. 402.

[46] Perrault, *Mémoires* (above, n. 42), p. xvi.

[47] Thomas Laqueur, *Making Sex. Body and Gender from the Greeks to Freud* (Cambridge and London: Harvard University Press, 1990), chap. 5.

[48] *HA*, 1701 [1719]: 21.

[49] Ibid., p. 22.

Normativization

Immediately after Jean Méry made public his new system, he published another article in which he described a case of Siamese twins.[50] In this particular case, the death of these children, from strangulation caused by the entangling of their umbilical cords, proved decisive in determining that fetal respiration took place through this particular vessel. It was also in 1692 that Méry presented another communication on two monstrous fetuses, in which he asserted that the bloodstream came from the pulmonary vein into the vena cava.[51] That was on 12 November. On 3 December, he denied the existence of the valve of the foramen ovale after the dissection of different monstrous fetuses. On the seventeenth, both he and Duverney experimented with different fetuses' hearts by insufflating air into the vena cava and observing the path taken by the air through these heart auricles and ventricles so monstrously deformed.[52] With slight variations, the same pattern followed from 1693 to 1712, both in public demonstrations that took place in the academy and in communications published in its *Mémoires*.[53] In the very first volume of the *Histoire de l'Académie*, for example, immediately after various papers on fetal circulation and on the natural history of the fetus, another communication was presented on the extraordinary structure of a human fetus's heart that seemed to challenge Méry's system.[54] This heart had three intercommunicated ventricles like those of the tortoise, and given the fact that the owner of this monstrous heart had lived for about five months in utero, and considering also that the aorta was twice the width of the pulmonary artery, the author concluded that these facts seemed to contradict Méry's opinion. Though, on the other hand, he also conceded that this heart was "really monstrous" (*effectivement monstrueux*),[55] perhaps meaning that it was difficult to infer any conclusions from such an abnormal structure. When the case

[50] *RM*, 1692, fol. 75, and Méry, *OCJM*, pp. 419ss.

[51] *RM*, 1692, fol. 119.

[52] *RM*, 1692, fol. 121.

[53] *RM*, t. XIII, 1693, fol. 129: "*M. Méry a lu une dissertation anatomique dans laquelle il prouve que los animaux qui ont un trou ovalaire à la base du coeur et une artère qui dégorge les poumons d'une partie du sang ne peuvent par cette raison se passer plus longtemps de la respiration que ceux qui sont privés de cette partie*"; *RM*, t. XIV, 1694, fol. 13: "*M. Méry a lu une dissertation pour expliquer pourquoi la tortue n'a point besoin d'une respiration continuée comme l'homme et qu'elle peut vivre longtemps sans respirer*"; ibidem, Fol. 15: "*M. Méry a fait voir un foetus qui, dans l'exterieur, paraît comme un crapaud; il y avait un trou qui apparemment était la bouche, un crâne gros comme une aveline, les parties intérieures fort confuses*"; and ibidem, Fol. 19: "*M. Méry a proposé quelques difficultés sur la coleur du sang, qui est plus vermeil dans le sang des artères que dans le sang des veines*".

[54] *HA*, 1699 [1718]: 25–30, 37–38.

[55] *HA*, 1699 [1718]: 37.

was reconsidered three years later, however, the evidence of this monster was clearly said to operate against Méry's position, for even though it was true that the aforementioned fetus was really monstrous, "monsters are only extraordinary, and what is extraordinary is by no means less natural."[56] This was not at all an isolated statement.

In 1700, the same year that Méry published his *Nouveau Système de la Circulation du Sang*, he also presented to the academy two observations on monstrous human fetuses from whose evidence he intended to substantiate his own hypothesis on fetal circulation.[57] That same year, the anatomist Alexis Littré (1658–1725) also dissected a heart of a forty-year-old man whose foramen ovale had remained open throughout his life.[58] In this particular case, after having measured all the tubes of a circulatory system that functioned like that of a fetus, the académie now admitted that this evidence presented by Littré seemed to confirm Méry's hypothesis:

> Monsters are usually regarded as games of nature. But the philosophers are very much convinced that nature does not play, that she always follows the same rules, and that all her works are, so to speak, equally serious. There can be extraordinary things but not irregularities. Furthermore, *it happens very often that these very extraordinary things provide the path to discover the general rules in which they all are included*.[59]

Many other similar comments may be found both inside and outside the French Academy.[60] In 1708, for instance, a book was published by Jean Palfyn, anatomist and surgeon of the city of Gant, capital of Flanders. The first part contained an anatomical description of the female reproductive organs; then a translation of Liceti's *De monstrorum causis*, and, finally, a description of the internal and external parts of a case of conjoined twins. There are a number of scholars who have already seen the linkage in this book between the pathologization of female genitalia and ongoing teratological discussions.[61] Interestingly enough, the book also contains, after the description of the anatomical circumstances of the case of conjoined twins, a small treatise entitled "Traité de la circulation du sang dans le foetus" in which

56 *HA*, 1703 [1720]: 36.

57 Méry, *OCJM*, pp. 193–198.

58 *HA*, 1701 [1719]: 36–38; *HA*, 1701 [1719]: 46–50. See also, Littré, "Observations sur un foetus humain monstrueux," in *MA*, 1701 [1719]: 90–97, and Duverney, "Mémoire sur la circulation du sang des Poissons qui ont des oüies, & sur leur respiration," *MA*, 1701 [1719]: 226–241.

59 *HA*, 1703 [1720]: 28.

60 *HA*, 1701 [1719]: 51.

61 Marie-Hélène Huet, *Monstrous Imagination* (Cambridge and London: Harvard University Press, 1993), pp. 56–61.

Palfyn also opposed Méry's system on the grounds of the incompatibility of Méry's conclusions with the anatomical evidence provided by the dissection of this monster.[62]

Besides, monsters were not only used to explain the fetal circulatory system. It is very well known that during the first quarter of the eighteenth century, numerous theories were proposed regarding fetal nutrition. According to some of these theories, the fetus was either nourished by menstrual blood, or through its mouth, or through the uterine milk, or through the umbilical cord, or even through pores in the skin.[63] In 1701, for example, Alexis Littré argued quite convincingly that fetal nutrition could not occur through ingestion of amniotic liquid, which he came to prove by means of a considerable number of otherwise normal human fetuses born without head or mouth.[64] This fact received further support from the case of a boy whose urine was expelled through the navel. Many teratological communications published in the Academy of Sciences during the first decades of the eighteenth century were meant to probe the impossibility of superfetation;[65] or to determine how the circulation between the mother and the foetus took place,[66] or to distinguish the different parts of the placenta or the chorion,[67] or even to examine other intricate questions such as those regarding the regeneration of tissues, or phenomena relating to ossification. It is true that this connection seemed on many occasions rather remote, but a certain sense of correlation should not be overlooked. That was the case of a story published in 1719 about a women whose toenails grew so fast that she was exorcized,[68] for even though this case remains by all standards a curiosity, we would be missing the point if some other related data were not to be considered at the same time. It is worth noticing, for example, that it was also in 1719 that the *Histoire de l'Académie* considered several other forms of regeneration, and published in the same volume an article and another communication on the regeneration of parts.[69] It was also in 1712 that Réaumur had pub-

62 Jean Palfyn, *Description anatomique des parties de la femme qui servent à la génération; avec un traité des monstres* [by Fortuno Liceti] *. . . et une description anatomique de la disposition . . . de quelques parties . . . de deux enfans nés dans la ville de Grand . . . 1703* (Leyden: Ve. B. Schouten, 1708).

63 Joseph Needham, *A History of Embriology* (New York: Abelard-Schuman, 1959), pp. 180–183.

64 *HA*, 1701 [1719]: 24; *MA*, 1701 [1719]: 93–94.

65 *HA*, 1701 [1719]: 294; *MA*, 1705 [1730]: 382–386.

66 *HA*, 1715 [1718]: 7.

67 Ibid., 9.

68 *HA*, 1719 [1720]: 38–43.

69 See *HA*, 1719 [1720]: "Sur la réparation de quelques parties du corps humain mutilées."

lished in the same *Histoire* his accounts on the regeneration of lost parts;[70] in 1707, the academy considered monstrous plants for the first time, along with some other phenomena of vegetation, and, in 1709, monstrosity was for the first time explained in those terms by the naturalist Jean Marchant (1650–1738).[71]

Conclusion

In the case of fetal circulation, the relationship between the normal and the pathological was built, and can be approached, from three different vantages. First, fetal circulation was extraordinary in itself. Because it occurred only in the fetus, it could not be considered normal. It was, rather, an exception within the exceptional character of fetal life and physiology. Second, the procedure to understand this extraordinary phenomenon was twofold. From the point of view of the old system, the fetal circulation followed essentially the same pattern as the adult circulation. The lack of pulmonary respiration in the fetus and its anatomical differences were exceptions and, to some extent, curable diseases. From the point of view of the new system, however, it was the study of comparative anatomy that would explain fetal circulation. As we have seen, part of the debate focused on determining to what extent the tortoise was a legitimate model of human fetal circulation; the point being that once we have taken both the monster and the tortoise as singularities, they are, at the same time normalized and pathologized. The monster, on the one hand, looks like a tortoise, whereas the tortoise is described as a monster. As Duverney wrote in the Perrault's *Histoire Naturelle*: "This so *uncommon structure* of ventricles and vessels [of the tortoise's heart] must have *specific usages* about which we shall remain silent until we have also explained that the structure of the lungs is by all means *equally extraordinary*."[72] This ontological confusion between monsters and tortoises is understandable once we accept that we have no interest in those beings "by themselves." This is also the reason that monsters could became the subject of so much scientific interest without ever being constituted, at the same time, in the object of any specific science. Indeed, there was never such a thing as a science of monsters. What came about in the nineteenth century was a science of minor and major deformities in both animals and humans. The science of monsters was continuously deferred because its subject matter was, ontologically, different. Yet not different enough to belong to a completely isolated kind of

[70] *MA*, 1712 [1714]: 226–245.

[71] *HA*, 1707 [1730]: 25–26; *HA*, 1709 [1711]: 42–44; *MA*, 1709 [1711]: 64–69.

[72] Duverney: "Description anatomique d'une grande Tortue des Indes," in Perrault, *Histoire naturelle* (above, n. 42); my emphasis.

objects. Tortoises, for example, were never monsters, but they were in the same epistemological relation with regard to the monstrous as monsters were with regard to the normal. They too belong to the history of teratology. Or at least they have the same right to be there as monsters do. When we talk about instantiation of monsters during the eighteenth century, we may well be applying alien categories into our subject matter. We may be wrongly assuming that because monsters have a history, there is *a* history of monsters, a self-contained narrative that would explain the fate of these beings over the course of the centuries. From the continuous instantiation of abnormal anatomical conformations in learned societies, we learn, for example, that "organization," as the anatomical expression of the use of the abnormal body, was a requirement of monstrosity. Not only the necessary condition but also, as in the case of our tortoises, the sufficient condition. The correspondence between the principles of formation of beings was so related to the principles of their deformation, that the investigation of monsters would necessarily shed some light on the general mechanisms of the animal economy.[73] Or in other words, monsters, who were ontologically unviable, both as a category of objects and as living beings, were extraordinary efficient, even feasible, as far as their epistemological functioning was concerned. Indeed, it was never their form that captured the imagination of the learned. It was rather the extraordinary ability that they seemed to have to maintain alive the use of their parts.

Appendix I. Publications of the French Academy of Sciences Related to Fetal Circulation

RM. (1692), *Registres Manuscrits*, vol. XIII, f° 75, et Mém. de l'Acad., 1692–1699, vol. X (la lecture de ce travail a été faite le 16 de janv. 1692), Jean Méry: "Circulation et Respiration du Foetus." (Also published in Jean Méry, *Oeuvres complètes de Jean Méry*, réunies et publiées par L. H. Petit, Paris, Felix Alcan (1888), pp. 113–127, and in J. Méry, *Nouveau Système de la Circulation du Sang* [Paris, Chez Jean Boudot, 1700]).

MAI. (1693), vol. X, p. 271 ss: Jean Méry: "Pourquoi le Foetus et la Tortue vivent très longtemps sans respirer." (Also in *OCJM*, pp. 115–118.)

[73] Charles Bonnet, *Considérations sur les corps organisés*, 2 vols. (Amsterdam: M. M. Rey, 1762); John Hunter, *On Monsters* (London: Van Voorst, 1775), in *Essays and Observations*, ed. R. Owen, 2 vols. (London: van Voorst, 1861), vol. I.

HAI. 1693 (1733), vol. II, 175–178. (*Histoire de l'Académie Royale des sciences depuis 1686, jusqu'à son renouvellement en 1699* [Paris, 1733].)

MAI. (1693), vol. X. p. 386 ss: Jean Méry: "Porquoi la respiration est nécessaire pour entretenir la vie de l'homme depuis qu'il est sorti du sein de sa mère, et même lorsqu'il y est encore enfermé, et qu'au contraire la tortue peut vivre très longtemps sans respirer." (Also in *OCJM*, pp. 118–126.)

HAI. 1694 (1733), vol. II: "Sur la circulation du sang," pp. 209–211.

RM. (1695), vol. XIV, Fol. 35: "M. Méry a lu un écrit sur le passage du sang par le trou ovale dans le foetus."

RM. (1695), vol. XIV, Fol. 37: "Résumé du mémoire et de la discussion," i.e.: Jean Méry, *De la circulation du sang du foetus par le trou ovale*. Extrait de Registres de l'Académie Royale des Sciences par M. Méry (Paris, 1695), in-4°. (BL. 1176.i.3 [4].)

RM. (1695), vol. XIV, Fol. 43: "M. Méry a continué sa dissertation sur le passage du sang dans le foetus de la veine cave dans l'aorte."

RM. (1695), vol. XIV, Fol. 156: "M. Méry a lu ce qu'il a ajouté à sa description de l'usage du trou ovale et du canal de communication". (Also in *OCJM*, pp. 146 ss.)

RM. (1695), vol. XIV, Fol. 176: "M. Méry a lu ce qu'il a ajouté à sa dissertation du mouvement du sang dans le foetus. Il a parlé aussi de l'experience qu'il a faite dans les animaux ayant lié l'aorte et la veine cave et soufflant par la trachée artère. L'air est entré dans les oreillettes."

HAI. 1695 (1733), vol. II: "Sur l'usage du trou ovale & du Canal de communication dans le Foetus," pp. 238–244.

RM. (1696), vol. XIV, Fol. 300: "Discourse sur l'usage du trou ovale, du canal de communication du troc de l'artère du poumon au troc de l'artère descendent dans le foetus et dans la tortue." (Also in *OCJM*, pp. 146 ss.)

RM. (1697), vol. XVI, Fol. 75: "Mémoire de l'usage du canal de communication qui se rencontre dans le foie du foetus entre la veine porte et la veine cave, démonstration sur les viscères d'un foetus." (See also J. Méry, *Traité*, 1700.)

HAI. 1697 (1733), vol. II, p. 299: "Diverses observations anatomiques," III.

HA. 1699 (1718): "De la circulation du sang dans le foetus," 25–30.

HA. 1699 (1718): "Sur l'histoire du foetus," 31–34.

HA. 1699 (1718): “Sur le coeur de la tortue,” 34–36.

HA. 1699 (1718): “Sur la structure extraordinaire du coeur d’un foetus humain,” 37–38.

MA. 1699 (1718): Duvernay: “Observations sur la circulation du sang dans le foetus, et description du coeur de la tortue et de quelques autres animaux,” 227–275.

HA. 1701 (1719): “Sur la circulation du sang dans le Foetus,” 36–38.

HA. 1701 (1719): “Sur la circulation du sang dans les poissons,” 46–50.

MA. 1701 (1719): Littré, “Observations sur un foetus humain monstrueux,” 90–97.

MA. 1701 (1719): Duverney, “Mémoire sur la circulation du sang des Poissons qui ont des ouïes, & sur leur respiration,” 226–241.

HA 1703 (1720): “Sur la circulation du sang dans le Foetus,” 32–36.

MA 1703 (1720): Méry: “Traité physique de Méry . . . contentant 1°. Un Examen des faits observez par M. Duverney au coeur des Tortuës de terre, 2°. Une Réponse à sa Critique du nouveau Système de la circulation du sang par le trou ovale du coeur du foetus humain, 3°. Une Critique des observations qu’a faites M. Buissiere sur le coeur de la Tortuë de mer, 4°. Une Description du coeur de ce même animal, 5°. Une Description du coeur d’une grande Tortuë terrestre de l’Amerique,” 337–467.

HA. 1708 (1709): “Sur la circulation du sang entre la mère et le foetus,” 36–39.

MA. 1708 (1709): Méry, “Problème d’Anatomie, sçavoir: si pendant la grossesse il y a entre la femme & son foetus une circulation de sang réciproque,” 186–194.

HA. 1717 (1719): “Sur une nouvelle valvule de la veine-cave inferieure qui peut avoir rapport à la circulation du sang dans le Foetus,” 17–21.

MA. 1717 (1719): Winslow, “D’une valvule singulière de la veine-cave inferiure, à l’occasion de laquelle on propose un sentiment nouveau sur la fameuse question du trou ovale qui semble également appuyé par les preuves favorables aux deux opinions contraires,” 211–226.

MA 1725 (1727): Winslow, “Eclaircissements sur un Mémoire de 1717, qui traite de la circulation du sang dans le Foetus, et quelques Remarques sur un Système particulier de M. Vieussens, & sur un écrit de M. Rouhaut sur cette même matière,” 23–34.

MA. 1725 (1727): Winslow, “Suite des éclaircissements sur la circulation du sang dans le foetus,” 260–281.

HA. 1739 (1741): 4–13.

MA. 1739 (1741): Lémery, “Sur le trou ovale. Premier mémoire,” pp. 31–50.

MA. 1739 (1741): Lémery, “Sur le trou ovale. Second Mémoire”, pp. 97–118.

MA. 1774 (1775): Sabatier, “Mémoire sur les Organes de la Circulation du sang du Foetus,” 198–202.

Appendix II. Treatises and Dissertations on the Fetal Circulatory System, 1700–1740

Jean Méry, *Nouveau système de la circulation du sang* (Paris, 1700).

Daniel Tauvry, *Traité de la génération et de la nourriture du foetus. Réplique aux réponses de M. Méry* (Paris, chez Barthelemy Girin, 1700), in-12.

Paul Buissière, *Lettre . . . pour servir de réponse . . . à M. Méry sur l’usage du trou ovale dans le foetus* (1700), in-12.

Jean Palfyn, “Traité de la circulation du sang dans le foetus, / . . . / pour la confirmation de l’opinion des modernes, contre le nouveau système de Monsieur Méry” in J. Palfyn, *Description anatomique* (Leyden: Ve. B. Schouten, 1708).

P. Verheyen, *Corporis humani anatomia liber primus, sucundus . . . accedit . . . controversia de foramine ovali inter authorem & D. Mery* vol. II (1710), in-4°.

Pierre Simon Rouhault, *Discours concernant les différents changements qui arrivent à la circulation du sang du foetus* (Turin, 1725), in-12.

P. S. Rouhault, *Réponse de P. S. Rouhault . . . à la critique faite à son mémoire de la circulation du sang dans le foetus humain par M. Winslow*, French and Italian ed. (Turin, 1728), in-4°.